Section II
Utilization Benchmarks

Methodology

The health care utilization benchmarks developed for this study were based on private sector averages adjusted for several factors including veteran Enrollee demographics and morbidity. These benchmarks consist of average health care utilization per 1,000 enrollees for 37 separate hospital inpatient and ambulatory (outpatient) service categories. Actual VA inpatient utilization for FY 2001 was compared to case-mix and severity adjusted benchmarks to estimate the degree of health care management currently achieved in the VA system. The benchmarks estimate health care utilization for the veteran Enrollee populations assuming VA is operating at degrees of health care management that vary by VISN. The degree of health care management is defined in terms of a loosely managed and a well managed health care system appropriate for each community health care delivery system. The loosely managed and well managed models could be considered two points of a continuum of health care delivery systems for each community. The placement on this continuum is referred to as the degree of community management. The more managed a system, the more it will emulate the well managed system. This is described in more detail later in this section under Health Care Management.

The benchmarks were created separately for three age groups: Under Age 45, Ages 45–64, and Ages 65 and Over. The benchmarks were developed for veteran enrollee groups classified by their preferred VA facility and their county of residence. Each enrollee group was further distinguished by Enrollee Type and Priority Level. The utilization benchmarks were developed in a six-step process:

1. Develop private sector utilization averages for each preferred facility or county locality for the services covered under the Medical Benefits Package and the Millennium Bill.
2. Adjust private sector utilization for the age and gender mix of the projected veteran Enrollees by Priority Level and Enrollee Type.
3. Modify the age/gender-adjusted utilization taking into account veteran Enrollee morbidity.
4. Adjust the resulting utilization benchmarks to reflect the appropriate managed health care delivery system.
5. Adjust the resulting utilization benchmarks for estimated veteran Enrollee reliance on VHA for their health care needs.

6. Apply an experience adjustment to the resulting benchmarks to reflect residual differences between modeled and actual historical utilization.

Definitions

Veteran enrollees are classified as Enrollee Pre, Past Enrollee Post, or New Enrollee Post. An Enrollee Pre is defined as an Enrollee who used VHA health care services at least once during FY 1996, FY 1997, or FY 1998. A Past Enrollee Post is defined as a veteran who enrolled in the national veteran enrollment database during FY 1999 but did not use VHA health care services during FY 1996, FY 1997, or FY 1998. A New Enrollee Post is defined as a veteran enrolled in the national veteran enrollment database on or after October 1, 1999 but did not use VHA health care services during FY 1996, FY 1997, or FY 1998.

The private sector population describes the population that is covered under some type of commercial insurance program for the Under Age 45 and the Ages 45–64 populations or by Medicare for the Ages 65 and Over population.

Veteran enrollees are classified by their Preferred Facility or County of Residence on record. The projection model includes facility detail at the VA Medical Center Facility level. Discussions of Preferred Facility level detail in this section refer to VA Medical Center Facilities.

Preferred Facility assignments are available in the VA enrollment data at the 5-digit station number (CBOC) level of detail. Consequently, Preferred Facility assignments in the enrollment data are mapped to the VA Medical Center Facility level of detail using the mapping provided by VA. This mapping assigns each 5-digit station number to MCCV station numbers developed by VA. The present mapping includes 178 MCCV facilities.

Private Sector Utilization Averages

Private sector utilization benchmarks for each preferred facility or county area are based on research contained in the Milliman Health Cost Guidelines (Guidelines) and have been trended for FY 2003 through FY 2022. The Guidelines are a cooperative effort of all Milliman health actuaries and represent a combination of their experience, research and judgment. An extensive amount of data is used in developing these Guidelines, including published and unpublished data. The ambulatory benchmarks are based on units per 1,000 enrollees and the inpatient benchmarks are based on inpatient days per 1,000 enrollees.

San Juan, Puerto Rico is included in the Preferred Facility list. The Puerto Rico private sector health care locality data reflects the native Puerto Rico health care delivery system. The VA Facility in San Juan is not believed to reflect this health care delivery system, but rather a typical Southern Florida health care system. Therefore, the San Juan utilization benchmarks reflect the health care practices of a Southern Florida service area. Manila, Philippines is also included in the Facility list. There were similar concerns for Manila as the San Juan Facility. Therefore, the Manila utilization benchmarks reflect the health care practices of a Hawaiian service area.

Covered Services

The VA Medical Benefits Package (MBP) specifies the health care coverage guaranteed to all veterans eligible for enrollment. Under the direction of VA, Maternity and Voluntary Sterilization benefits are also included. Emergency Care benefits are included at the typical level of utilization and intensity within VA facility capabilities. Utilization has been adjusted to this level on a national basis through the specific experience adjustment for Emergency Care services (see Section V, Actual-to-Expected Analysis in this report). These benefits may or may not become part of the final MBP. The private sector averages have been adjusted to reflect all of these health care services. Benefit coverage in the MBP varies for Priority Levels 1 through 4 and 5 through 7. Specific analyses for Long Term Care and Emergency Care provided under the Millennium Bill are addressed in Sections VI and VIII of this report, respectively. Non-medical care benefit costs outside of the modeled MBP and the specific Millennium Bill services are also addressed in Section VII of this report. Partial or excluded medical benefit coverage assumptions are as follows:

Excluded Benefits	Priority Levels 1 through 7c: Newborn Inpatient (IP) Care, Well Baby Exams, and Chiropractor
Partial Benefits	Priority Levels 5 through 7: 50% Glasses/Contacts, 50% Hearing Aids

For all three Age Groups (Under Age 45, Ages 45–64, and Ages 65 and Over), the following Physician services are excluded from the Ambulatory portion of the cost models because they represent Physician costs associated with Inpatient stays: Inpatient Surgery (Primary Surgeon, Assistant Surgeon, and Anesthesia), Inpatient Visits (Hospital, Extended Care, and Critical Care), Radiology (IP Professional), and Pathology (IP Professional). VA unit costs include the Physician costs in the Inpatient Hospital per diems. Therefore, these costs are not included in the Ambulatory

section of the cost models. The Medicare Allowable charge levels for Inpatient Hospital per diems have been adjusted to include physician costs so that they are comparable to VA unit cost measures.

For Inpatient Maternity, the Physician costs associated with inpatient care are included in the Ambulatory portion of the cost models, since the cost models use community billed charges to project the cost of Maternity services. VA unit costs for Maternity are not available since VA does not provide these services within their facilities. Unlike VA unit costs, inpatient facility and associated physician costs are available separately for community billed charges.

For all Age Groups and Priority Levels, the Prescription Drug benefit provides for over-the-counter drugs. During FY 2001 and FY 2002 through February 1, 2002, drugs dispensed for non-service connected (NSC) conditions were subject to a $2 copay for Priority Levels 2 through 4 and 6 veterans. All Priority Level 7 veterans paid the $2 copay as well as Priority Level 5 veterans above a certain income threshold (estimated to be 45% of prescriptions). On February 1, 2002 the prescription drug copay increased to $7. The majority of over-the-counter drugs cost less than the $7 copay amount; therefore, the over-the-counter drug utilization is expected to decrease.

VA was able to provide FY 2000 pharmacy data for both prescription and over-the-counter drugs. This data included national drug codes (NDC) for each drug dispensed. Private sector Prescription Drug benefits typically cover insulin, but not the other over-the-counter drugs covered by VA. The private sector Prescription Drug utilization was adjusted to include over-the-counter drug utilization at the $2 and $7 copay levels by Priority Level. These adjustments were calculated using the VA pharmacy utilization data, the average wholesale price (AWP) by NDC, and the estimated proportion of drugs supplied for NSC conditions by Priority Level (provided by VA). The $2 copay level benefit adjustments were used in projections through January 31, 2002 and the $7 copay level benefit adjustments thereafter. Consequently, FY 2002 projections incorporate a weighted average of both benefit level adjustments based on the FY 2002 projected enrollee months before and after February 1, 2002.

Copay Adjustments

Copay schedules are unique for each Priority Level, and vary depending on whether the services provided are for a service-connected condition. Further, the copay level for prescription drugs changed as of February 1, 2002 and the ambulatory copay level changed as of December 1, 2001. For purposes of this analysis, it is assumed that before December 1, 2001, Priority Levels 1 through 6 do not have ambulatory copays and Priority Level 7 has a $50.80 copay for select ambulatory

encounters ($0 for all others). After December 1, 2001 Priority Level 7 copays changed to $0, $15, or $50 based on the type of ambulatory encounter. For Priority Level 7 the $0/$50.80 copay utilization adjustments are used in projections through November 30, 2001 and the $0/$15/$50 copay utilization adjustments are used thereafter. Consequently, FY 2002 projections incorporate a weighted average of both utilization adjustments based on the FY 2002 projected enrollee months before and after December 1, 2002. As discussed in the Covered Benefits section, prescription drugs dispensed for NSC conditions before February 1, 2002 were subject to a $2 copay for Priority Levels 2 through 4 and 6 veterans. All Priority Level 7 veterans paid the $2 copay as well as Priority Level 5 veterans above a certain income threshold (estimated at 49% of prescriptions). As of February 1, 2002 the prescription drug copay increased to $7. The $2 copay utilization adjustments are used in projections through February 1, 2002 and the $7 copay utilization adjustments are used thereafter. Consequently, FY 2002 projections incorporate a weighted average of both utilization adjustments based on the FY 2002 projected enrollee months before and after February 1, 2002.

The copay utilization adjustments were modified further to reflect the fact that some veterans in Priority Levels with copays do not intend to pay the copay when using VHA services. Others may not be required to pay the copay due to hardship waivers. It is expected that these veterans will have utilization that reflects a zero dollar copay benefit. VA provided information regarding the amount of copays assessed to veterans and the amount actually collected. This information was used to make appropriate adjustments to the utilization benchmarks.

Demographic Adjustments

Age/Gender adjustment factors were calculated by Preferred Facility or County of Residence, Priority Level, Enrollee Type and Age Group using the projected veteran enrollment data for each fiscal year. The age/gender adjustment factors reflect the differences in health care utilization patterns associated with the age and gender composition of the veteran enrolled population relative to the average private sector population.

Estimated Reliance

The underlying private sector utilization is based upon data that includes 100% of a member's health care utilization. These utilization measures overstate veteran Enrollee utilization within the VA health care system, since many of the Enrollees have another health care provider (via employment, Medicare or Medicaid). The reliance adjustment allows for adjustment to the fully reliant expected utilization to reflect estimated veteran partial reliance on the VA health care system. An analysis for

calculating reliance adjustments was conducted during the FY 2001 ELDA and was updated during FY 2002 ELDA.

The reliance factors for the FY 2001 ELDA were developed from the responses to the VA and non-VA health care utilization questions in both the 1999 Enrolled Veterans Survey performed by Condor and the 2000 Enrolled Veterans Survey performed by Shugoll Research. The data obtained from these surveys was adjusted for credibility. The factors were calculated in a three-step process: 1) analyze the survey responses, 2) develop preliminary reliance factors and 3) apply credibility analysis. This methodology was used to develop the inpatient and outpatient reliance factors. This analysis was performed separately for the Under Age 65 and Ages 65 and Over populations, as well as the Enrollee Pre, Past Enrollee Post and New Enrollee Post populations.

The update to the reliance adjustments during the FY 2002 ELDA was based on a comparative study of VHA and HCFA utilization for veterans Ages 65 and Over enrolled during calendar year (CY) 1999. Reliance adjustments for Ages 65 and Over Enrollee Pre and Past Enrollee Post were calculated directly from this study. The results of this study were used to modify the reliance adjustments calculated for the FY 2001 ELDA for Under Age 65 Enrollees and for Ages 65 and Over New Enrollee Post. The factors were calculated in a 5-step process:

1) Calculate HCFA utilization during CY 1999 for veterans Ages 65 and Over enrolled during CY 1999;
2) Calculate VHA utilization during CY 1999 for veterans Ages 65 and Over enrolled during CY 1999;
3) Develop preliminary reliance factors for Enrollee Pre Ages 65 and Over and for Past Enrollee Post Ages 65 and Over based on the utilization data;
4) Adjust the preliminary factors for credibility; and
5) Adjust the reliance factors developed for FY 2001 ELDA for New Enrollee Post Ages 65 and Over and for all Enrollees Under Age 65 to reflect the improved reliance factors developed in Steps 1 through 4.

This methodology was used to produce reliance factors separately for four types of inpatient services and for twelve types of outpatient services.

The Under Age 65 factors are applied to the Under Age 45 and Ages 45–64 Enrollee populations. The data was not credible to develop reliance factors individually for these smaller age bands.

Calculation of Reliance Adjustments for the 2001 ELDA

The first step involved tabulating the responses to the health care utilization questions on the survey by VISN and Priority Level for the six groups described above. The questions used were those that referred to the respondent's use of VA and non-VA health care services. Specifically, the number of inpatient days and the number of outpatient visits reportedly provided by VA and non-VA health care systems were tabulated. Milliman relied on the responses given in the survey with little interpretation. The responses were not validated for consistency with responses to related questions.

The second step involved the calculation of individual preliminary reliance factors by VISN and Priority Level. The formula for reliance is the number of VA days or visits divided by the sum of VA days or visits and non-VA days or visits for an individual. This provided a proxy for the percentage reliance on VA for health care services for inpatient and outpatient services by VISN and Priority Level.

The final step involved applying credibility analysis to the results from the previous step. The reliance factors developed from the survey responses were not fully credible in all cells (i.e., the number of respondents that were health care users for a particular Age Group, Enrollee Type, VISN and Priority Level were sometimes quite small). The full credibility approach described in section 5.3 of Introduction to Credibility Theory, (2^{nd} edition, by Thomas N. Herzog, Actex Publications, Winsted, CT, 1994) was used to establish full credibility for the analysis as 30 users of health care within a cell. The partial credibility approach in section 5.4 of the same text was used to develop the final credibility adjusted reliance factors. The formula used was:

$$C = Z \times R + (1 - Z) \times H, \text{ where}$$

C is the credibility adjusted reliance factors,
Z is the credibility weights ($Z = N \div 30$ and $0 \le Z \le 1$),
N is the number of users of health care,
R is the specific reliance factors calculated in step 2, and
H is the *universal* reliance factors calculated below.

Full credibility was attached to the reliance factors calculated for the aggregate of all Priority Levels within a VISN and for all VISNs within a Priority Level. These aggregate factors were used to develop *universal* reliance factors for each VISN and Priority Level. These factors were calculated by multiplying the ratio of the VISN aggregate reliance factor over all Priority Levels to the National

aggregate reliance factor over all Priority Levels by the Priority Level aggregate reliance factor over all VISNs.

The 2000 Survey collected data on Past Enrollee Post and New Enrollee Post veterans for Priority Levels 5 and 7c. The 1999 Survey collected data on Enrollee Pre and Past Enrollee Post veterans for all Priority Levels. The 1999 Survey data was used to establish the final reliance factors for the Enrollee Pre group. Data from both surveys was used to estimate the final reliance factors for the Enrollee Post groups. The Past Enrollee Post respondents in the 1999 Survey and the New Enrollee Post respondents in the 2000 Survey were only enrolled for approximately three months when they were surveyed. This biases the data regarding reliance since the VA health care usage responses could only reference the three months of enrollment, but the non-VA health care usage responses referenced a full twelve months. Resulting reliance factors would be underestimated using this data.

The Past Enrollee Post veterans were surveyed once again during the 2000 Survey. This allowed for a more accurate estimate of reliance for this group. These new reliance factors and the reliance factors estimated from the 1999 Survey for this same population were used to estimate the adjustment necessary to bring the 1999 Survey based reliance factors for Past Enrollee Post up to the proper level based on a 12-month reference period of VA health care usage for those Priority Levels not covered in the 2000 Survey. Since only Priority Levels 5 and 7c veterans were contacted for the 2000 Survey, adjustments for Priority Levels 1 through 4 and 6 were estimated using the Priority Level 5 data and for Priority Level 7a using the Priority Level 7c data. The adjustments were based on the percentage change, toward 100% reliance, from the 1999 Survey based reliance factors to the 2000 Survey based reliance factors for Past Enrollee Post. For example, if the 1999 Survey data produced a Priority Level 5 reliance factor of 20% (based on 3 months of eligible VA health care usage) and the 2000 Survey data produced a Priority Level 5 reliance factor of 60% (based on 12 months of eligible VA health care usage), then the adjustment to the 1999 Survey based Priority Level 1 reliance factor of 30% was 35% [(60% – 20%) ÷ (100% – 20%) × (100% – 30%)]. This produced an adjusted reliance factor of 65% for Priority Level 1.

This analysis was performed for each VISN to produce Past Enrollee Post outpatient reliance factors. A parallel analysis for inpatient reliance was performed. Due to the low numbers of inpatient users in the survey by VISN and Priority Level, credibility issues required that these adjustments be developed at the national level.

New Enrollee Post reliance factors were developed using a similar adjustment methodology. An additional adjustment was applied to the Past Enrollee Post reliance factors developed from the 1999

Survey for Priority Levels 1 through 4 and 6 through 7a. This adjustment was calculated in the same manner as the adjustment described for the Past Enrollee Post reliance factors. The difference was an attempt to estimate the difference between New Enrollee Post and Past Enrollee Post reliance. It appeared, based on Priority Levels 5 and 7c, that for the most part reliance was higher for New Enrollee Post than it was for Past Enrollee Post. In the few instances where it was lower, the calculation was modified to measure the percentage change toward 0% reliance in the adjustment methodology described above. The adjusted Past Enrollee Post reliance factors were used to estimate New Enrollee Post reliance factors for Priority Levels 1 through 4 and 6 through 7a.

A separate set of reliance factors were calculated for Prescription Drugs by adjusting each Outpatient reliance factor a certain percent of the way toward 100%. The percent adjustment was 25% and 50% for Under Age 65 and Ages 65 and Over, respectively. This adjustment was made to account for the fact that many of the veterans have increased reliance on VA for Prescription Drugs compared to other Outpatient services, since coverage is either less or non-existent (i.e., Medicare) in the private sector.

Calculation of Reliance Adjustments for the 2002 ELDA

The study to produce reliance factors for the 2002 ELDA included veterans Ages 65 and Over who were enrolled during CY 1999. Enrollee Pre and Past Enrollee Post veterans were studied, but New Enrollee Post veterans were not studied, as they were enrolled for at most three months during CY 1999. Because the study involved a match of HCFA data to VHA data, the Under Age 65 population could not be studied.

First, total HCFA utilization for each enrolled veteran was calculated. This calculation was based on the complete CY 1999 Standard Analytical File produced by HCFA. The methodology and computer programs for this step were designed by Milliman and performed by VA's Management Science Group under the direction of Ted Steffos. Total inpatient days for each veteran were assigned to four broad inpatient categories based on the stay's DRG. The four categories are Medical, Surgical, Psychiatric and Substance Abuse. The total number of outpatient services performed, based on the frequency of billed CPT-4 and HCPCS codes, were also counted for each veteran. These services were classified into several major categories:

- Office, Home and Urgent Care Visits
- Emergency Room Visits
- Outpatient Psychiatric and Substance Abuse

- Physical Exams
- Physical Medicine
- Cardiovascular
- Immunizations
- Surgery (outpatient and office only)
- Radiology
- Pathology
- Other Visits
- Other Procedures

In addition, each veteran in the study was identified as not eligible for Medicare benefits, eligible for Medicare benefits and not enrolled in a Medicare+Choice plan or eligible for Medicare benefits and enrolled in a Medicare+Choice plan. This was used to determine the completeness of a veteran's claim data captured for this analysis.

Second, total VHA utilization was calculated for each enrolled veteran. This calculation was based on the FY 1999 and FY 2000 workload files, combined and truncated to produce a CY 1999 workload file. From the inpatient workload, only acute care stays were studied and total days in each of the four inpatient categories listed above were counted. From the outpatient workload, the total number of billed CPT codes were counted and classified into the twelve outpatient categories listed above. Pathology workload was modified to more closely reflect private sector billing practices. Specifically, groups of laboratory procedures were grouped into single laboratory panels and given a count of one. In addition, each veteran was limited to one office visit per clinic stop per day, under the presumption that multiple billings of the same office visit CPT during the same clinic stop during the same day reflect billings from non-physician providers.

Third, the HCFA claims were "matched" to the VHA workload for each enrolled veteran and a raw reliance factor for each veteran was calculated for each category of care. For example, a veteran with three VHA office visits and two HCFA office visits would have a raw reliance factor of 60% (3 ÷ 5) for Office Visits. The aggregate reliance for a category of care is the simple average of the individual raw reliance factors for that category of care. For each category of care, raw reliance factors were aggregated by Priority Level, VISN and Enrollee Type. Veteran enrollees who were members of Medicare+Choice plans during CY 1999 were excluded from the aggregation because their HCFA data is considered incomplete.

Fourth, the raw reliance factors were adjusted based on credibility analysis. This process was identical to the credibility process used for the 2001 ELDA described above. A small number of fully credible cells exhibited 0% reliance. For these cells the lowest reliance factor for all other VISNs within that Priority Level, prior to performing the credibility adjustment, was used. This was done to guarantee that no final reliance factors of 0% were produced. In two instances, the credibility process was insufficient to produce adequate reliance factors. For inpatient Psychiatric, Past Enrollee Post, Priority Level 6, the reliance factors calculated for Priority Level 7c were used. For inpatient Substance Abuse, Past Enrollee Post, "smoothed fully credible" composites by Priority Level were produced based on the by-Priority Level relativities for Enrollee Pre Inpatient Substance Abuse.

Fifth, the reliance factors developed for the FY 2001 ELDA for New Enrollee Post, Ages 65 and Over Enrollees and for all Under Age 65 Enrollees were adjusted to reflect the improved reliance factors developed using the HCFA data match methodology. The Under Age 65 Enrollee Pre and Past Enrollee Post reliance factors were updated by comparing the broad FY 2001 ELDA survey-based reliance factors for Ages 65 and Over to equivalent reliance factors developed from the HCFA data match analysis.

An aggregate set of reliance factors for all inpatient services was created from the HCFA data match and used to develop relativities between each of the inpatient service categories and the aggregate. This was necessary since the survey data used for FY 2001 was for all inpatient services combined. The survey-based inpatient reliance factors and the HCFA match relativities were used to produce survey-based reliance factors for the four inpatient categories. The FY 2001 survey-based outpatient reliance factors were developed from outpatient visit data and were very consistent with the HCFA data match reliance factors for office visits. The survey-based outpatient reliance factors and the HCFA match relativities between office visits and all of the other outpatient categories were used to produce survey-based reliance factors for the several outpatient categories.

Next, the New Enrollee Post reliance factors were calculated by applying the relative relationship between the Past Enrollee Post survey-based factors developed for the FY 2001 ELDA to the New Enrollee Post survey-based factors developed for the FY 2001 ELDA. All of the relative relationships were based on the percentage change, toward either 0% or 100% reliance, from the "base" reliance factors to the "target" reliance factors. For example, if the Office Visit reliance factor for Priority Level 5 is 60% ("base") and the Physical Exams reliance factor for Priority Level 5 is 90% ("target"), then the adjustment to the FY 2001 ELDA survey-based Priority Level 5 outpatient reliance factor of 65% is 26.3% [(90% – 60%) ÷ (100% – 60%) × (100% – 65%)]. This

produces a reliance factor of 91.3% for Priority Level 5 Physical Exams. If the "target" is less than the "base," then the formula uses 0% instead of 100%.

The reliance factors developed during the FY 2002 ELDA were used for the FY 2003 ELDA since time did not permit an update using the new 2002 Enrollee Survey data. It is anticipated that the reliance factors will be updated for the FY 2004 ELDA.

Morbidity Adjustments

Background

Morbidity factors attempt to quantify the relative health status of a set of individuals to the health status of a base set of individuals. For these projections, the applicable base set of individuals was the population serviced by private sector health care providers. This population is typically referred to as a commercial population for individuals under 65 years of age and a Medicare population for individuals age 65 and over. Medicare also covers individuals under the age of 65 but for purposes of these projections the definition of Medicare was limited to the Medicare aged population only. The analysis for calculating morbidity factors was conducted during the FY 2001 ELDA. The Under Age 65 factors were applied to the Under Age 45 and Ages 45–64 enrollee populations.

The purpose of morbidity factors for any benchmarking project is to adjust the underlying utilization and intensity of services to reflect the morbidity of the target population relative to the morbidity of the underlying population. Because private sector data was the basis for the veteran utilization benchmarks, it was necessary to develop relative morbidity factors that allowed the underlying benchmarks to be adjusted to account for the anticipated differences in morbidity.

It has long been recognized that the veteran who seeks health care from VHA medical facilities is generally sicker than the veteran who chooses not to use VHA medical facilities, as well as the non-veteran. Since VHA medical facilities must give veterans with a service-connected disability top priority for receiving health care, it is not surprising that the overall morbidity of VHA medical facility users (*user*) is worse than that for veterans who do not use VHA medical facilities (*non-user*) and for private sector populations. Many of the veterans who seek care at VHA facilities have some type of mental illness (frequently a result of combat exposure) and many clinicians would argue that these patients are more difficult to treat for medical conditions than patients with the same medical condition but without any coexisting mental health or substance abuse conditions.

Many of the actual conditions that veteran *users* are hospitalized for in VHA medical facilities are different than what would be expected for a private sector population with a similar age and gender mix. For instance, if the expected percentage of admissions for each diagnostic related group (DRG) is examined, the most common types of admissions (adjusted for the age and gender mix of the veteran *user* population) are related to cardiovascular and respiratory conditions and major joint, limb, back and neck surgeries. The top DRGs for actual admissions at VHA facilities were related to cardiovascular, respiratory, mental health or substance abuse conditions. Tables II–1 and II–2 illustrate the differences in the top 10 expected admissions and the top 10 actual admissions (discharges) by DRG. The private sector column indicates the percentage of admissions by DRG for a private sector population adjusted for the age and gender mix of the veteran *user* population. The VA column lists the percentage of discharges veteran health care facilities actually experienced during FY 1997.

Table II–1
Top 10 Private Sector Expected Admissions by DRG
(Adjusted for VA Demographics)

DRG	DRG Description	Private Sector Expected	VA Actual
112	Percutaneous Cardiovascular Proc	5.3%	1.1%
127	Heart Failure & Shock	2.4%	3.0%
14	Specific Cerebrovascular Disorders	2.3%	1.5%
143	Chest Pain	2.2%	1.7%
107	Coronary Bypass W/O Cardiac Cath	2.1%	0.6%
106	Coronary Bypass W/ Cardiac Cath	2.0%	0.0%
122	Circulatory Disorders W/ MI	1.9%	1.2%
Cardio- or Cerebro-Vascular Subtotal		18.0%	9.1%
209	Major Joint & Limb Reattachment Procedures	3.0%	0.7%
215	Back & Neck Procedures W/O CC	2.5%	0.3%
Major Joint, Limb, Back & Neck Surgeries		5.5%	1.0%
89	Simple Pneumonia & Pleurisy Age >17 W/ CC	2.4%	2.0%
Respiratory Subtotal		2.4%	2.0%
All Other DRGs		74.1%	87.9%
Total		100.0%	100.0%

Table II–2
Top 10 Actual VA Discharges by DRG

DRG	DRG Description	Private Sector Expected	VA Actual
430	Psychoses	1.1%	6.9%
435	Substance Abuse Treatment W/ CC	0.2%	4.9%
434	Substance Abuse Treatment W/O CC	0.3%	2.1%
427	Neuroses Except Depressive	0.1%	2.0%
436	Substance Abuse with Rehab Therapy	0.3%	1.9%
Mental Health & Substance Abuse Subtotal		2.0%	17.9%
127	Heart Failure & Shock	2.4%	3.0%
88	Chronic Obstructive Pulmonary Disease	1.4%	2.7%
132	Atherosclerosis W/ CC	1.1%	1.9%
140	Angina Pectoris	1.0%	1.9%
Cardiovascular Subtotal		5.8%	9.6%
89	Simple Pneumonia & Pleurisy Age >17 W/ CC	2.4%	2.0%
Respiratory Subtotal		2.4%	2.0%
All Other DRGs		89.8%	70.6%
Total		100.0%	100.0%

In addition, similar differences are seen on an outpatient basis. For example, it would be expected to see about six or seven outpatient psychiatric visits per 100 office visits for an age and gender adjusted private sector population. Using data from the Appendix to the "Explanatory Model to Project Demand for Care at the National and Network Level: Analysis of Select VISNs" published by Abt Associates, Inc. on February 6, 1998, VHA actually experienced about 70 outpatient psychiatric visits per 100 office visits for the Under Age 65 veteran *users* and about 20 for the Ages 65 and Over veteran *users*. It is probable that many of the differences indicated in these preliminary analyses are impacted by VHA and private sector practice pattern differences. However, the differences are so great that practice patterns could not possibly account for the entire difference.

One issue that complicates the development of veteran morbidity factors is that of reliance. Unlike the vast majority of members of commercial insurance programs, veterans who use VHA health care facilities are usually not reliant on VHA health care facilities for 100% of their health care needs. That is not to say that no veteran relies 100% on VHA for their health care needs, but many do not. Some actually rely very little on VHA. These veterans may take advantage of the primary care health screens offered by VHA facilities but choose to have any follow-up work performed by their private sector providers. Also, it is believed that many veterans who are eligible for Medicare may use VHA primarily for prescription drug coverage since Medicare does not cover prescription drugs. These reliance issues are difficult to isolate and quantify. For instance, reliance issues are imbedded in the inpatient DRG and outpatient psychiatric analyses illustrated above. The mental health related services may be utilized more at VHA facilities because of veteran reliance on VHA for these services, as well as higher veteran need (higher morbidity). It is difficult to determine how much of the difference is due to reliance and how much is due to morbidity. In developing the relative morbidity factors, 100% reliance was assumed. The impact of veteran partial reliance on projected utilization was estimated through separate reliance factors.

Methodology

It has long been recognized in private sector health care that appropriate adjustments to premium payments and capitation rates to reflect the risk being assumed are needed for financial stability and market competitiveness. Traditional risk adjustment methodologies in the commercial market include adjustments for age, gender, industry, geographic area and family size. Since 1985, payment rates to Medicare risk contractors have been based on Centers for Medicare and Medicaid Services' (CMS) calculation of the Adjusted Average Per Capita Cost (AAPCC), with adjustments for the age, gender, county, and the institutional, disability, working and welfare status of the member.

Traditional approaches to risk adjustment fall short, however, because they do not account for the differences in health status between demographically similar members of a population. Medicare and Medicaid programs have recognized this difference in a small way by creating separate payment rates for enrollees with specific diagnoses. HCFA has special payment rates for enrollees with End Stage Renal Disease. Medicaid programs in several states have separate payment rates for enrollees with the AIDS diagnosis. The result is that those health plans having a higher than average percentage of members with these diagnoses will receive a higher than average payment rate, with the opposite being true for those with a lower than average percentage of members with these diagnoses. In addition, the intent is to remove any disincentives for enrolling members with specific diagnoses, thereby expanding patient choice. Table II–3 illustrates the impact on the composite payment rate for health plans experiencing varying selection relative to members with AIDS using AIDS-specific rates.

Table II–3

Sample Impact of Selection on Average Payment Rates
With and Without Risk Adjustment

		Annual Payment Rate		
Health Plan	Selection	Population Allocation	No Risk Adjustment	With Risk Adjustment
Plan 1	Average			
	AIDS	2%	$1,500	$11,300
	Other	98%	$1,500	$1,300
	Average	100%	$1,500	$1,500
Plan 2	Positive Selection			
	AIDS	0.5%	$1,500	$11,300
	Other	99.5%	$1,500	$1,300
	Average	100%	$1,500	$1,350
Plan 3	Adverse Selection			
	AIDS	4%	$1,500	$11,300
	Other	96%	$1,500	$1,300
	Average	100%	$1,500	$1,700

Table II–3 illustrates that all three health plans receive the same average payment rate when no risk adjustment mechanism is in place. However, with adjustments for the prevalence of members with the AIDS diagnosis, Plan 2 has its average annual payment rate reduced from $1,500 to $1,350 per member as a result of the positive selection. Plan 3 has its average annual payment rate increased from $1,500 to $1,700 per member because of adverse selection.

Some states have gone a step further, using diagnosis-based risk adjustment for their Medicaid SSI populations and even their AFDC populations. Diagnosis-based risk adjusters are based on the same concept demonstrated in the above example and expanded to include many more diseases and diagnoses.

A diagnosis-based risk assessment methodology uses ICD-9 diagnosis codes as the basis for health status identification and corresponding risk classification. The process of diagnosis-based risk assessment is much more complicated than traditional approaches to calculating risk factors because there is not a unique one-to-one relationship between members and ICD-9 codes. With traditional risk adjustment factors, each person has one and only one identifier per demographic adjustment factor (i.e., age, gender, industry, and geographic area). With ICD-9 codes, a member may have none or many diagnosis codes during the time period over which the data is gathered. Another complexity that differs from traditional factors is that diagnoses and the associated ICD-9 codes can change over time for each member, creating a moving target.

Because there are over 11,000 ICD-9 diagnosis codes, those with similar risk characteristics need to be grouped together for rating purposes. Grouping by risk characteristic is often done with traditional factors (i.e., ages being banded together or areas being rated by three-digit Zip code); however, the process of deciding how to group diagnosis codes is much more difficult. The Disability Payment System (DPS) has been developed for this specific purpose.

The DPS Model was created at the University of California – San Diego using claim data from the Medicaid programs of seven states. The DPS model groups diagnoses into 18 major diagnostic categories, some of which can be further subdivided by cost (very high, high, medium or low) for a total of 43 categories. Exhibit II-1 summarizes these groupings and gives a sample diagnosis for each. The initial mapping of ICD-9 codes to DPS categories can result in a single patient being mapped into multiple buckets. The costs associated with each of the 18 major categories to which a patient belongs are added together to determine the relative cost. The cost of a single major category is calculated one of two ways. Eight of the 18 categories are fully counted, which means that costs are added together for a person that has been mapped to multiple levels in the same major category (i.e., low-cost and high-cost). Ten of the 18 are hierarchical in that costs are only counted for the highest cost subgroup, or most severe condition, within each major category.

This grouper is a hierarchical model that recognizes coexisting conditions, based on Medicaid disabled SSI recipient data. The data sources for the grouper are also reflective of the veteran populations of primary concern.

- Approximately 22% of veteran users are under age 65 and partially or totally disabled with a service-connected condition.
- Another 44% are age 65 and over.
- Of the remaining 34% it could be presumed that many of these veterans either have multiple or chronic illnesses and that some could also be disabled (with a non-service-connected condition).

In this grouper individuals are characterized by each of their coexisting conditions. They are not limited to one group; they can be classified into multiple grouper categories. This allows the costs associated with each diagnosis group to be added together to produce the overall cost profile for an individual.

The methodology used to produce relative morbidity factors for the veteran population proceeded in two phases. The first phase involved application of the DPS grouper to the Medicare and commercial databases to develop appropriate risk weights. The second phase involved application of the DPS grouper and the developed risk weights to veterans' diagnosis data, and subsequent analysis of the expected costs.

Development of Risk Weights

For every member in the Medicare and commercial databases, their demographic information was recorded, their total costs in each of the four major categories described below were calculated, and their risk groupings using the DPS grouper were determined. VA's Management Science Group (MSG) used this information to develop all of the necessary risk weights using ordinary-least-squares regression.

The demographic variables used in the regressions were age, gender and (for Medicare) region. For the commercial data, only members with ages between 19 and 64 were considered. For the Medicare data, only members with ages greater than 64 were considered. The Medicare data was mapped into seven regions consistent with VISN boundaries.

All of the claims in the databases were mapped into four health care service categories. (Note that the databases do not contain prescription drug information.) The four health care service categories

(HSCs) were based on the location of care (Inpatient or Outpatient) and whether the care was for physical or mental health conditions. These categories are referred to as Inpatient Physical, Inpatient Behavioral, Outpatient Physical, and Outpatient Behavioral. Costs associated with maternity, well-newborn, well-baby and chiropractic services were excluded.

The DPS grouper was applied to all available recorded diagnoses for each member. Each member was mapped to as many DPS groups as appropriate based on the rules of the grouper. Some members did not have diagnoses associated with any of the 43 DPS groups. All diagnoses for each member, regardless of the type of claim (HSC) that the diagnosis was attached to, are used to determine the DPS group counts.

MSG ran eight regressions each on the commercial and Medicare databases. They ran four regressions for all members with no DPS diagnosis and four regressions for all members with at least one DPS diagnosis. The four regressions refer to each major HSC defined above. Each regression analyzed a single dependent variable—the total claim dollars for the HSC. The independent variables were age, gender, polynomial combinations of age and gender, region (for Medicare), and the 43 DPS groups (for members with at least one DPS diagnosis). All DPS groups were used for each regression, regardless of the type of claim (HSC) that the diagnosis was attached to. Some DPS groups were rolled-up into smaller groups to reflect the infrequent incidence of these conditions in the databases. These regressions were performed on a concurrent basis.

Banded age/gender factors based on the commercial and Medicare databases were also produced. Region factors based on the Medicare database were developed, with the impact of age and gender removed. These factors represent relative claim costs reflective of all disease incidences. These factors were used to develop estimated costs for health care users (those members with claims) by age, gender and region, without regard to health status.

Application of Risk Weights

Because the diagnoses from actual veteran facility utilization were used to estimate the relative morbidity of veteran Enrollees, some of the reduction in expected utilization due to partial veteran reliance on VHA is buried in the raw relative morbidity factors. The actual diagnoses recorded by VHA providers will represent less than 100% of the total diagnoses reported for a veteran Enrollee (this includes private sector provider recorded diagnoses), but it will still be a higher percentage than the percentage of total veteran utilization that is provided by VHA facilities. This is due to the fact that a VHA provider can record a diagnosis, even though full treatment is not received at a VHA facility. In other words, a VHA provider might diagnose a problem, but the enrollee might choose to seek care for that diagnosis in the private sector. In addition, a VHA provider might record a secondary diagnosis while that provider only treats the symptoms of the primary diagnosis. For instance, an enrollee with diabetes who is receiving treatment for a mental health disorder may choose to obtain non-mental health care in the private sector. Also, many enrollees who are eligible for Medicare may use VHA to primarily provide prescription drugs. Many of the veterans' diagnoses will be recorded, but only a portion of their total utilization will be obtained via VHA. Since less than 100% of the average veteran enrollee's diagnoses are captured in VHA data, the resulting morbidity factors will reflect a portion of the partial reliance issue.

The solution to this problem was to consider the relative morbidity for a subset of veterans. This subset contained only those veterans who were heavily reliant on VHA (according to their 1999 Enrolled Veterans Survey responses and the VETERANS SF-36 & HEALTH BEHAVIORS Survey responses) *and* had at least one diagnosis recorded during FY 1998 (*reliant users*). The DPS grouper was applied to the diagnosis data for these *reliant users*. The 16 sets of risk weights (for two Age Groups, with and without DPS diagnoses, and for the four major HSCs) developed in the regression analysis were applied to VA *reliant users*, according to their age, gender, region and DPS groups. This produced for each *reliant user* an estimated claim cost in each of the four HSCs. The ratio of the estimated claim cost for an HSC to the age/gender banded claims estimates for an HSC is the relative morbidity factor for that Enrollee and HSC. Morbidity factors were summarized for each of the four HSCs by Priority Level and VISN, for Enrollee Pre, Past Enrollee Post and New Enrollee Post veterans, and Under Age 65 and Ages 65 and Over Enrollees.

Due to the sometimes low available sample sizes, credibility analysis was used to smooth the results. The credibility method applied to the morbidity factors was similar to the method used in the reliance factor development. When dealing with claim costs, rather than encounters (as in the reliance analysis), a larger number of *reliant users* are needed to reach full credibility in the morbidity

analysis. Actuarial standards commonly set this level at 1,000 lives in claims credibility analysis; the same number was assumed for the outpatient morbidity analysis. Inpatient claim frequencies are much lower than outpatient claim frequencies, so the full credibility level was increased for inpatient to 2,000 lives.

The following methodology was applied separately to each HSC, Age Group and Enrollee Type.

The Under Age 65 Enrollee Pre aggregate morbidity factors by Priority Level were fully credible for all Priority Levels in the outpatient analyses and all but Priority Level 7a in the inpatient analyses based on the number of *reliant users* in each Priority Level. The aggregate morbidity factor for Priority Level 7c was used as an estimate for the Priority Level 7a aggregate morbidity factor to the extent that the Priority Level 7a aggregate morbidity factor was not credible. A common credibility formula was used to estimate a credibility adjusted aggregate inpatient morbidity factor for Priority Level 7a for each inpatient HSC (physical and mental):

$$C(7a) = Z \times P(7a) + (1 - Z) \times P(7c), \text{ where}$$

C(7a) is the credibility adjusted aggregate morbidity factor for Priority Level 7a,
Z is the inpatient credibility weight ($Z = N \div 1{,}000$ and $0 \le Z \le 1$),
N is the number of inpatient *reliant users*,
P(7a) is the inpatient aggregate morbidity for Priority Level 7a, and
P(7c) is the inpatient aggregate morbidity for Priority Level 7c

The Ages 65 and Over Enrollee Pre aggregate morbidity factors by Priority Level were fully credible for all Priority Levels except Priority Level 6 in the outpatient analyses and all but Priority Levels 6 and 7a in the inpatient analyses based on the number of *reliant users* in each Priority Level. The aggregate morbidity factor for Priority Level 7c was used as an estimate for the Priority Levels 6 and 7a aggregate morbidity factors to the extent that the Priority Levels 6 and 7a aggregate morbidity factors were not credible. The same credibility analysis used for the Under Age 65 Priority Level 7a factors was used here.

Similar analyses were performed for the Past Enrollee Post and New Enrollee Post morbidity factors. The major difference was that a combination of the relativities of the Enrollee Pre credibility adjusted aggregate morbidity factors by Priority Level and the relativities of the Past Enrollee Post credibility adjusted aggregate morbidity factors by Priority Level were used to estimate the "non-credible" factor in the credibility formula described above for Past Enrollee Post. The relativities of the

Enrollee Pre credibility adjusted aggregate morbidity factors by Priority Level were used to estimate the "non-credible" factor in the credibility formula described above for some of the Priority Levels that were not fully credible. It was assumed that the relationships among the Priority Levels in the Enrollee Pre factors would be an appropriate estimate for the relationships among the Priority Levels in the Past Enrollee Post factors to the extent that the Past Enrollee Post factors were not credible. For example, if the Past Enrollee Post aggregate morbidity factor for Priority Level 1 was fully credible, but the Past Enrollee Post aggregate morbidity factor for Priority Level 4 was not fully credible, the ratio of the Enrollee Pre Priority Level 4 credibility adjusted aggregate morbidity factor over the Enrollee Pre Priority Level 1 credibility adjusted aggregate morbidity factor was applied to the Enrollee Pre Priority Level 4 aggregate morbidity factor. For other Priority Levels it was assumed that the relationships for the Enrollee Pre should apply to the credibility adjusted Past Enrollee Post factors. This was done to retain factor relationships between certain sets of Priority Levels.

Similarly, it was assumed that the credibility adjusted Past Enrollee Post relationships by Priority Level would be appropriate to estimate the relationships among the Priority Levels in the New Enrollee Post factors to the extent that the New Enrollee Post factors were not credible. The following tables list the ratios used in the analyses:

Table II–4
Past Enrollee Post

	Under Age 65		Ages 65 and Over	
Priority Level	Inpatient	Outpatient	Inpatient	Outpatient
1	1 to 3	FC	1 to 3*	1 to 3
2	2 to 3	FC	2 to 3*	2 to 3
3	FC	FC	3 to 5	FC
4	4 to 1*	4 to 1	4 to 3*	4 to 3
5	FC	FC	FC	FC
6	6 to 7c	6 to 7c	6 to 7c*	6 to 7c
7a	7a to 7c	7a to 7c	7a to 7c*	7a to 7c
7c	FC	FC	7c to 5	FC

FC = Fully Credible

* The ratio is applied to the credibility adjusted aggregate morbidity factor, rather than the "raw" aggregate morbidity factor.

Table II–5
New Enrollee Post

	Under Age 65		Ages 65 and Over	
Priority Level	Inpatient	Outpatient	Inpatient	Outpatient
1	1 to 3*	1 to 3*	1 to 3*	1 to 3*
2	2 to 3*	2 to 3*	2 to 3*	2 to 3*
3	3 to 5	3 to 5	3 to 5	3 to 5
4	4 to 3*	4 to 3*	4 to 3*	4 to 3*
5	FC	FC	FC	FC
6	6 to 7c*	6 to 7c*	6 to 7c*	6 to 7c*
7a	7a to 7c*	7a to 7c*	7a to 7c*	7a to 7c*
7c	7c to 5	7c to 5	7c to 5	7c to 5

FC = Fully Credible

* The ratio is applied to the credibility adjusted aggregate morbidity factor, rather than the "raw" aggregate morbidity factor.

The relativities among the aggregate morbidity factors by VISN were not fully credible for all of the inpatient and outpatient analyses based in the number of *reliant users* in each VISN. As such, the individual morbidity factors for each VISN and Priority Level were frequently not fully credible. The following formula was used to calculate credibility adjusted morbidity factors by VISN and Priority Level:

$$C = Z \times r \times H + (1 - Z) \times H, \quad \text{where}$$

C is the credibility adjusted morbidity factors,
Z is the credibility weights ($Z = N \div 2{,}000$ (inpatient) and $N \div 1{,}000$ (outpatient) and $0 \le Z \le 1$),
N is the number of *reliant users*,
r is the VISN ratios described below, and
H is the aggregate morbidity factors described below.

For each Priority Level, the value for H is the credibility adjusted aggregate relative morbidity factor for all *reliant users* in that Priority Level. This is the best estimate of relative morbidity, given the available information. For each VISN, the value *r* reflects the ratio of the relative morbidity of the VISN to the result if the VISN's *reliant users* all had the aggregate relative morbidity for their Priority Level. For VISNs that were not fully credible, the credibility adjusted aggregate relative

morbidity factor for a particular Priority Level was used to the extent the VISN was not credible. This credibility adjustment was similar to the one used for determining the aggregate credibility adjusted morbidity factor by Priority Level. Thus, for each VISN and Priority Level cell, the value $r \times H$ represents the VISN's non-credibility-adjusted relative morbidity factor.

The PCS and MCS scores developed in the SF-36 and SF-36 Veterans Surveys were used to validate the overall level of relative morbidity estimated using the above methodology. The diagnosis-based morbidity factors attempt to measure the difference in relative morbidity between private sector utilization and veteran utilization. There is concern that the diagnosis data captured by VA and the risk adjustment process may not fully reflect the difference in morbidity. This could be due to the fact that the survey respondents who indicated 100% reliance on VA for their health care needs may not truly be 100% reliant. If this is the case, then all of the diagnoses for an enrollee were not captured. The mean PCS and MCS scores from the SF–36 and SF–36 Veterans Surveys for the general U.S. population, adjusted for age and gender of the enrollee population, were determined. Then the diagnosis-based relative morbidity scores associated with the enrollees with mean PCS and MCS scores were calculated. It was expected that the relative morbidity scores would be near 1.00. However, this was not the case. An additional adjustment was made to the relative morbidity scores to account for this difference.

Prescription drug relative morbidity factors were based on the inpatient and outpatient morbidity factors. Using Milliman research and knowledge of prescription drug utilization patterns, the prescription drug morbidity factors were developed as a weighted average of each of the inpatient and outpatient morbidity factors. Both inpatient and outpatient non-prescription drug utilization impacted prescription drug utilization. It was estimated that 7% of the Inpatient Physical, 3% of the Inpatient Mental Health, 80% of the Outpatient Physical and 10% of the Outpatient Mental Health relative morbidity factors represent the prescription drug relative morbidity factor.

During the FY 2003 model update, it was determined that the inpatient morbidity factors were not adequately reflecting the difference in relative morbidity for the different types of inpatient stays. For example, the model tended to under-predict medical stays and over-predict surgical stays. Similarly, psychiatric stays were under-predicted and substance abuse stays were over-predicted. It is theorized that the morbidity adjustments, which are global for all medical and surgical inpatient stays and global for all psychiatric and substance abuse stays, do not sufficiently measure the impact of enrollee health status on these different types of stays.

Reliance also affects the impact enrollee health status has on the various categories of inpatient stays. For example, anecdotal evidence suggests that enrollees choose the VA health care system for less complex inpatient surgical care and the private sector for more complex inpatient surgical care. The health status based risk assessment methodology used to develop the relative morbidity factors does not consider whether a diagnosis, which traditionally leads to an inpatient surgical stay, actually resulted in a surgical stay in the VA health care system. The enrollee could well have chosen to have the surgery performed in the private sector. In this case, surgical stays would be over-predicted in the model.

On the other hand, additional anecdotal evidence suggests that enrollees have more chronic conditions than non-veterans. These two pieces of anecdotal information and the fact that the model over-predicts medical stays and under-predicts surgical stays indicate that a higher relative morbidity factor is needed for medical stays than for surgical stays. Since the morbidity study only assesses relative morbidity for both medical and surgical stays combined, an adjustment was needed to increase the assumed relative morbidity for medical stays and reduce the assumed relative morbidity for surgical stays.

It is suggested that psychiatric and substance abuse stays need separate morbidity factors since the cost variance within psychiatric stays is much larger than the cost variance within substance abuse stays. The DPS risk weights confirm this and even indicate that some of the most costly substance abuse conditions are similar in cost to moderate psychiatric conditions. Since the morbidity study only assesses relative morbidity for both psychiatric and substance abuse stays combined, an adjustment was needed to increase the assumed relative morbidity for psychiatric stays and reduce the assumed relative morbidity for substance abuse stays.

These morbidity factor adjustments were developed using the actual-to-expected analysis described in Section V to generate factors to appropriately increase the inpatient physical morbidity factors for medical stays and decrease them for surgical stays and to appropriately increase the inpatient mental health morbidity factors for psychiatric stays and decrease them for substance abuse stays. Separate actual-to-expected ratios were obtained from the actual-to-expected analysis for medical, surgical, psychiatric and substance abuse inpatient admissions. The goal was to adjust the morbidity factors so that the actual-to-expected ratios for medical and surgical admissions were equal and the actual-to-expected ratios for psychiatric and substance abuse admissions were equal. In order to achieve this, the inpatient physical morbidity factors were split into two components, medical and surgical, and the inpatient mental health morbidity factors were split into two components, psychiatric and

substance abuse. These adjustments were made at the Age Group (Under Age 65 and Ages 65 and Over) and Priority level.

Health Care Management

Facility or County, Enrollee Type, Age Group, and Priority Level specific utilization benchmarks for each fiscal year were developed by applying the detailed age/gender and morbidity factor adjustments described above to the loosely managed private sector utilization averages for the Facility or County locality. These utilization benchmarks were then adjusted to reflect the anticipated level of management achieved at the Facilities within each VISN. The level of management is typically described in terms of the degree of health care management and the following definitions are standard in the industry.

- Loosely Managed Model: reflects the utilization patterns that would result if physicians were paid on a fee-for service basis with no financial or other incentives to manage care.
- Moderately Managed Model: reflects utilization patterns that are halfway between the Loosely Managed and the Well Managed models.
- Well Managed Model: represents a health care system where the best observed practices are used to achieve the lowest utilization possible without compromising quality of care. While there is no single "ideal" description of a well managed system, certain characteristics are common to very efficient health care systems, such as

    - Active use of treatment guidelines, such as the M&R Care Guidelines™,
    - Programs to educate physicians on how to provide medical care more efficiently,
    - Financial incentives which reward providers for utilization management,
    - On-site utilization management of inpatient services,
    - The use of a primary care manager,
    - Telephonic nurse triage,
    - Active use of physician assistants and nurse practitioners,
    - Demand management programs that teach members when to seek medical assistance,
    - Information systems that can support utilization monitoring efforts and provider incentive programs, and
    - Active use of case managers to facilitate treatment of acute and chronically ill patients.

The well managed model represents a set of utilization levels that can be achieved by a single, well-run delivery system with the appropriate infrastructure. The M&R Care Guidelines™ were used to establish the well managed private sector models used for this analysis.

The degree of community management (DoCM) is referred to when comparing the level of management achieved by VA facilities during fiscal years 1999 through 2001 to these loosely managed utilization benchmarks. The loosely managed utilization benchmark for each community is set at 0% DoCM and the well managed utilization benchmark is set at 100% DoCM. From these baselines the FY 2001 DoCM is established for each VISN using actual VA length of stay (LOS) data from FY 2001.

Methodology

Inpatient Length of Stay

The Inpatient Utilization benchmarks developed for this study are based on the Milliman LOS Efficiency Index™. This represents individual case-by-case benchmark LOS reflecting the All Patient Refined DRG[1] (APR-DRG) by severity and further reflecting the actual diagnoses, procedures, admission source and discharge disposition. A benchmark LOS is established for each admission reflecting these variables and the statistically determined benchmarks from the LOS Efficiency Index™. Avoidable days are then calculated by comparing the actual LOS to the benchmarks. These are then compared to avoidable day levels on a regional basis.

Background Description of the Hospital Efficiency Index™

The Hospital Efficiency Indices (HEI) represent statistical/actuarial methodologies for analyzing hospital inpatient admissions, length-of-stay (LOS) and days, as compared to benchmark most efficient practice, in order to estimate potentially avoidable admissions and days. The primary objective of the HEI is to compare any set of given inpatient hospital experience to the equivalent case-mix/severity adjusted most efficient practice found anywhere in the U.S. The results are all indexed to this common benchmark (most efficient practice) to determine potentially avoidable days and admissions and to readily allow direct comparisons on a consistent basis.

[1] All copyrights in and to APR-DRGs are owned by 3M. All rights reserved.

The methods used are statistical, not clinical, in nature, with clinical input on appropriate aspects, and actuarial judgment to produce reasonable and usable results. The HEI results report potentially avoidable days and admissions, but these results do not mean that the estimated avoidable days and admissions are inappropriate. Rather the results mean that, as adjusted for case-mix, severity, diagnoses, procedures and other statistical variables, these potentially avoidable days and admissions are in excess of benchmark levels. These excess levels can result because of less effective treatment patterns while in the hospital or because disease management practices for chronic diseases are not implemented by providers or not adhered to by patients and thus result in a higher frequency of admissions than in the benchmark hospitals. A patient could be sick enough that a hospital admission is necessary, however, on a statistical basis it could have been avoided had the patient been put on an appropriate drug or monitoring regimen, for example. Furthermore, days at the end of an appropriate admission could be potentially avoidable (but necessary) because recovery is delayed due to a delay in scheduling a surgical procedure or other delays in the treatment process. The Hospital Efficiency Indices are developed in two parts – the LOS Efficiency Index™, used to determine avoidable days by LOS at the DRG and severity level, and the Admission Appropriateness Index™, used to determine potentially avoidable admissions within specialty and by DRG. The avoidable admissions are also converted to avoidable days. Note that either undercoding or upcoding of diagnoses and procedures, or any other data inaccuracies, could distort the results of these analyses.

Separate Hospital Efficiency models are developed for Medicare inpatient care (Medpar data based on UB-92 information), and Commercial (HMO, PPO, indemnity) and Medicaid admissions using public data from 20 states.

VA Analysis

In analyzing VA experience for this calculation, the Medicare models were selected for two main reasons. First, approximately 45% of the VA cases had a patient age of 65 or over. Second, the high percentage of disabled enrollees and the high percentage of psychiatric and substance abuse admissions is more characteristic of a Medicare disabled population. The combination of these two factors makes the VA data set much more similar to a Medicare population than a commercial population. Furthermore, many of the commercial benchmark utilization models for the age 50 and over population, where the disease and diagnoses are similar to those of the over age 65 population (e.g., heart and other chronic diseases) are similar to the Medicare models. In fact, an early comparison of the VA's percentage avoidable days under both the commercial and Medicare models

produced similar results. Therefore, the use of the Medicare models appeared to be appropriate. Of course, all of the analyses reflect the actual case-mix and severity of the VA admissions.

The admissions appropriateness models were not used because the VA utilization is selective (i.e., not all admissions for these patients are at VA hospitals), which could bias the results. However, there may be a way to incorporate this analysis in the future. Arguments can be made that the VA admission appropriateness levels are either more or less efficient than the Medicare patient population. By excluding this analysis, the implicit assumption is that the relative admission efficiency level is equivalent to the relative VA LOS efficiency level. However, on an allocated basis, the LOS days avoidable comprise nearly two-thirds of the total days avoidable, representing a substantial majority of the weight in inpatient utilization efficiency analysis.

Data Adjustments

Several adjustments were made to make the data more usable and appropriate:

- Reassigning the VA discharge status to either;
  - Discharged home (VA disposition code = 0-4)
  - Transferred to another facility (VA disposition code = 5)
  - Died (VA disposition code = 6, 7)
- Reassigning admissions with no age or gender to aged 60, male with the exception of admissions falling in MDC13, Diseases and Disorders of the Female Reproductive System or MDC14, Pregnancy, Childbirth and Puerperium which were assigned as aged 30, female. The age 60 was selected consistent with the VA age distribution, but it has minimal impact on the results.

In total, over 99.99% of the records were assigned to a HCFA DRG. Approximately 3.6% of the records grouped using the 3M Grouper did not match the DRG assigned by VA on the record. In performing the Efficiency Analysis, the results for the 3M APR-DRG Grouper were used and included records where the HCFA DRGs did not match. The Efficiency Analysis used 524,137 of the 567,106 records (≈92%). The remaining records were not included in the analysis for one of the following reasons:

- Early death and transfers (which are excluded from the models) – 5%
- High or low LOS outlier (which are excluded from the models) – 1%
- Low volume DRGs with no models – 2%

Inpatient Results for FY 2001

The LOS Efficiency Analysis results are based on a case-by-case analysis of the LOS in excess of the benchmark LOS for each admission reflecting VA's actual case-mix and severity. Admissions appropriateness models were not incorporated into the analysis. In aggregate over the entire U.S., 46% of total VA days are in excess of the benchmark LOS. For medical/surgical days, VA days in excess of the benchmark LOS are 42%. This implies that if VA could operate at the most efficient levels, 46% of the days (and 42% of medical/surgical days) could potentially be avoided. Alternate levels of care may be necessary to accomplish this, however.

The underlying loosely managed utilization benchmarks vary dramatically by geographic area. Managed care penetration and time impact fee-for-service utilization since providers who contract with managed care organizations learn to manage care for all of their patients, not just those covered by managed care plans. For example, the loosely managed utilization benchmarks in the Pacific Northwest, where significant managed care penetration has existed for several decades, are much lower than the loosely managed utilization benchmarks in the East, where managed care is a newer concept. By VISN, the community percentage of days in excess of the benchmark LOS range from highs of 50% and 47% in VISNs 3 and 2, respectively, to lows of 26% and 28% in VISNs 19 and 20, respectively. The community percentages in other VISNs fall somewhere between these extremes and generally follow a pattern of being less efficient on the East Coast and more efficient on the West Coast.

The DoCM measures the ratio of VA's days avoidable in an area to the community average days avoidable based on VA's mix of services. VISN-wide percentages of days avoidable range from 83% to 120% of the overall nationwide percentage of days avoidable within VA. The wide range of degrees of health care management across the nation, however, causes an even greater variation by VISN when each VISN's level of management is compared to the loosely managed level in its community. In every VISN VA is operating less efficiently than the community-wide norms. VISN-wide VA DoCM percentages range from -66% in VISN 19 to -4% in VISN 2. The nationwide VA DoCM is -35%. This does not mean VA utilization is 35% worse than the loosely managed benchmarks. It means that on the continuum of health care management within a community, where 0% is loosely managed and 100% is well managed, VA is 35% outside the continuum.

VISN 20 produced some of VA's most efficient results compared to the VA nationwide percentage of avoidable days. However, VISN 20 results are less efficient than the community average. VISN 3, on the other hand, produced some of VA's most inefficient results. When compared to their

community average, however, VISN 3 has the second most efficient DoCM. In general, VA's DoCM was closer to community norms in less efficient areas as measured by the LOS Efficiency Index™.

It was determined that the model's predictive powers would be enhanced if the single DoCM used for each VISN was expanded to four separate DoCM indicators per VISN. Nationally, the FY 2001 VA DoCM levels for medical, surgical, psychiatric and substance abuse are –29%, –54%, –30% and –30%, respectively. These levels of DoCM are very similar, other than for surgical stays, but they vary significantly by VISN. Table II-6 displays the VISN DoCMs for each of the four types of inpatient stays.

Table II-6

FY 2001 DoCM

VISN	Medical	Surgical	Psychiatric	Substance Abuse	Total
1	-23 %	-41 %	-19 %	15 %	-19 %
2	-5 %	-30 %	22 %	-14 %	-4 %
3	-4 %	-23 %	-2 %	-46 %	-10 %
4	-19 %	-44 %	-36 %	-37 %	-30 %
5	-38 %	-64 %	-9 %	-44 %	-37 %
6	-36 %	-50 %	-40 %	-47 %	-41 %
7	-23 %	-44 %	-42 %	-21 %	-32 %
8	-50 %	-79 %	9 %	2 %	-46 %
9	-21 %	-51 %	-46 %	-10 %	-32 %
10	-19 %	-62 %	-34 %	-45 %	-35 %
11	-24 %	-51 %	-39 %	-51 %	-37 %
12	-48 %	-66 %	-52 %	-7 %	-49 %
13	-41 %	-41 %	8 %	33 %	-28 %
14	-16 %	-47 %	-18 %	-24 %	-24 %
15	-19 %	-39 %	-24 %	-34 %	-25 %
16	-31 %	-55 %	-22 %	-3 %	-32 %
17	-32 %	-71 %	-44 %	-77 %	-48 %
18	-16 %	-52 %	-32 %	-52 %	-33 %
19	-44 %	-64 %	-99 %	-41 %	-66 %
20	-50 %	-62 %	-20 %	-1 %	-38 %
21	-19 %	-53 %	-67 %	-63 %	-47 %
22	-18 %	-61 %	-16 %	-65 %	-31 %
National	-29 %	-54 %	-30 %	-30 %	-35 %

It was assumed that the DoCM for admissions is two-thirds of the way from the VISN LOS DoCM to the 0% DoCM. This reflects an assumption that VA admissions policies more closely resemble

loosely managed community admissions policies than VA length of stay policies resemble loosely managed community length of stay policies.

The FY 1999 data used in the FY 2001 ELDA degree of management analysis and the FY 2000 data used in the FY 2002 ELDA degree of management analysis were reanalyzed using the FY 2001 VA case mix and the 2001 community benchmarks. These revised FY 1999 and 2000 DoCM measures for each VISN were compared to the FY 2001 DoCM measures for each VISN. Nationally, the DoCM improved by 11.5% from FY 1999 to FY 2000. In other words, VA management moved 11.5% of the way toward a loosely managed system, or 0% DoCM. These improvements vary by VISN, ranging from 3% for VISN 5 to 39% for VISN 1. One VISN actually moved in the wrong direction. VISN 11 worsened by 6%.

It was not possible to perform the same comparative analysis on the FY 2001 results since the methodology for determining acute versus long-term behavioral health stays was changed for FY 2001. However, if the analysis is split into two pieces and medical and surgical stays are grouped together and psychiatric and Substance Abuse stays are grouped together, the analysis can be performed for FY 2001 for the medical and surgical stays group. Nationally, the DoCM for medical and surgical stays improved by 13% from FY 2000 to FY 2001. These improvements vary by VISN, ranging from 0% for VISN 1 to 49% for VISN 3. Two VISNs actually moved in the wrong direction. VISN 9 worsened by 1% and VISN 14 worsened by 8%.

The assumption in the FY 2002 projection models was that each VISN would move 25% of the way toward the community loosely managed system each year, reaching a loosely managed state by FY 2010. The results of this year's analysis show that this assumption may be too aggressive. However, given the current level of VA health care management, there is ample opportunity to improve VA DoCM and it is still reasonable to assume that VA can achieve a 25% improvement each year.

For the FY 2003 projection model it is assumed that for every fiscal year after 2001 each VISN's DoCM will move 25% of the way toward the 0% DoCMs. This essentially puts each VISN at its community loosely managed level by FY 2010. Most of the assumed improvement in management occurs during the first couple of years. This is a reasonable assumption and VA should be able to make fairly basic changes to achieve these levels. If the levels of improvement achieved during FY 2000 and FY 2001 are continued for the next ten years, most VISNs would not achieve 0% DoCM by 2010. Only VISNs 2 and 3 would achieve a degree of management that reflects a loosely managed system in their community within three to four years if the medical and surgical degree of

management improvements achieved during FY 2001 are assumed to continue for all stays (i.e., behavioral health stays also).

The interpretation of these results must reflect the infrastructure and nature of the VA population. These factors can affect the potential achievable efficiency of the VA system.

For each fiscal year, Inpatient Maternity services were modeled at 0% DoCM. Because VHA Facilities are buying these services from the private sector community, it is reasonable to assume that they will be provided at a management level consistent with community norms.

Ambulatory DoCM Assumption

For this analysis, there was no data available to establish the current level of management achieved within VA for Ambulatory Care. It is assumed that VA's actual utilization during FY 1999 was at the community loosely managed level. This is considered to be a reasonable assumption since practice patterns within VA are not perceived to be as efficient as the community. Yet, this is offset by the fact that much of the care that should be delivered on an outpatient basis was still delivered on an inpatient basis. It is also assumed that a 5% DoCM for FY 2001 and a 0.5% improvement each fiscal year thereafter. These levels should be achievable within these timeframes.

Exhibit II–1
DPS Model Categories

Fully Counted Categories	Sample Diagnoses
Central Nervous System	
High-Cost	Quadriplegia
Medium-Cost	Muscular Dystrophy
Low-Cost	Cerebral Palsy
Skeletal and Connective	
High-Cost	Juvenile Arthritis
Medium-Cost	Osteoporosis
Low-Cost	Disc Disorders
Gastrointestinal	
High-Cost	Liver Disease
Low-Cost	Intestinal Obstruction
Metabolic	
High-Cost	Pituitary Dwarfism
Medium-Cost	Malnutrition
Low-Cost	Adrenal Disorders
Cancer	
High-Cost	Nervous System Cancers
Medium-Cost	Lymphomas
Low-Cost	Melanoma
Eye and Ear	Cataracts
Skin	
High-Cost	Decubitus Ulcers
Low-Cost	Other Chronic Skin Ulcers
Gynecologic	Ovarian Cysts

Hierarchic Categories	Sample Diagnoses
Psychiatric	
High-Cost	Schizophrenia
Medium-Cost	Manic Depressive
Low-Cost	Hysteria
Pulmonary	
Very High-Cost	Congenital Pneumonia
High-Cost	Congenital Lung Anomalies
Medium-Cost	Chronic Obstructive Pulmonary Disease
Low-Cost	Simple Asthma
Cardiovascular	
High-Cost	Heart Transplant Status
Medium-Cost	Congestive Heart Failure
Low-Cost	Acute Myocardial Infarction
Diabetes	
High-Cost	Adult-onset with Complications
Low-Cost	Adult-onset without Complications
Hematologic	
Very High-Cost	Hemophilia (clotting factors VIII and IX)
High-Cost	Hemophilia (other clotting factors)
Medium-Cost	Hemoglobin C Sickle Cell Disease
Low-Cost	White Blood Cell Disorders
Substance Abuse	
High-Cost	Drug dependence or abuse
Low-Cost	Alcohol dependence or abuse
Mental Retardation	
High-Cost	Profound Mental Retardation
Medium-Cost	Severe Mental Retardation
Low-Cost	Mild and Moderate Mental Retardation
Renal	
High-Cost	Renal Failure
Low-Cost	Nephritis
Cerebrovascular	Cerebral Thrombosis
AIDS	Kaposi's Sarcoma